

PRO

TECH

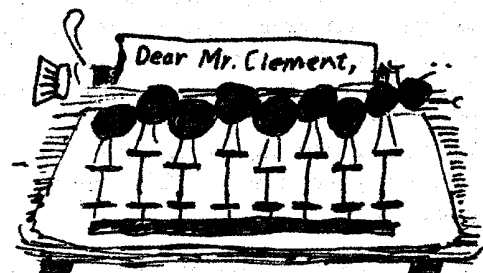
NICS

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MESKLINE
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PYROTECHNICS #36, Edited and Published by Gail and Jamie Hanrahan, under the auspices of White Rabbit Press (our motto: "I'm late! I'm late!"). PYROTECHNICS purports to be a general-interest fanzine focusing on (but not exclusively devoted to) hard sf and real-world science and technology. It also serves as the now-and-then journal of the ~~organization club~~ mob of tech-minded fen known as General Technics (or "those silly people with the blinkies") whenever any of them deigns to send us any news.

Pyro is available for The Usual: Letters of comment, artwork, articles, cartoons, anything else we can publish (surprise us!), and most especially in exchange for other fanzines. It is also available by subscription at the rate of \$3/four issues, and while it is fashionable to make disparaging remarks about people who "only" send money, we have found it quite difficult to buy paper and postage with LOCs! To receive PYROTECHNICS, send one (or more) of the above to:

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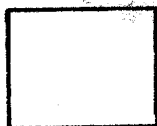
at least once a year or so. (Make checks payable to one of us personally, not the zine.) LOCs and text-only contributions can also be mailed electronically via Usenet to

$$\left\{ \begin{array}{l} \text{decvax} \\ \text{ucbvax} \\ \text{ihnp4} \end{array} \right\} !\text{sdcsvax!calmasd!gail}$$

(If you don't know what that means, see page 9.)

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IF THE BOX AT THE LEFT IS STAMPED, THIS IS THE LAST ISSUE YOU WILL RECEIVE UNLESS WE HEAR FROM YOU. We can't go on sending this thing to everyone on the list forever. Write! Draw! Send a check! Or something. Thank you.

Things That Go Bang! in the Night

Another Episode from the Adventures of Barry Gehm

About a month ago (as I write this) I found a bomb in my lab.

It was a Saturday, and I had come into the lab where I work in the Biochemistry department at Michigan State to check on the results of a procedure I'd been doing the night before (attaching radioactive iodine to a protein I've been working with). When I let myself into the lab I heard a loud high-pitched tone like an electronic alarm. I walked around and discovered that it was coming from our freezer, which has a temperature alarm. I opened it up and found that everything inside was up to room temperature. I also found that the temperature control dial inside had been turned to "off". That was pretty odd, since I had checked the setting myself only the night before. In order for the contents to thaw as they had, whoever turned it off must have done so very early that morning. At first I thought that maybe my professor or one of our undergraduate students had intended to defrost it, and then forgotten about it. Turning off a freezer is a very effective way of vandalizing a biochemist's lab, but not one that many people would think of.

I had also noticed some dark-orange-stained filter paper lying in one of our sinks, so I called my professor and said that it looked like we had had someone playing in the lab. He asked me to check and make sure it wasn't one of our undergrads who had gotten careless. We had had problems with vandalism once or twice before when somebody had apparently forgotten to lock up, but not anything as serious as this.

I called our undergrads and learned that they hadn't been in. I also looked around the lab some more to see what else had been disturbed. I noticed a plastic bottle lying empty in the sink next to the stained filter paper. Previously it had been kept next to the pH meter, filled with concentrated ammonia solution. I checked the pH meter and the electrode was broken, but none of the other chemicals kept near it were missing.

As I looked around some more I noticed a heavy-walled glass flask sitting on the benchtop where my professor usually worked. It had a mass of dark, wet crystals in the bottom. It didn't look like the sort of thing he would produce; it did look like it might have something to do with the stained filter paper in the sink. There was a faint purple haze in the flask. I smelled it (leaning over it -- I didn't want to leave fingerprints). There was some odor but I couldn't identify it.

I looked around to see if anything else in the area had been disturbed and I noticed nearby a smaller Erlenmeyer flask that had a few crystals clinging to the inner sides. A close look showed that these crystals were definitely iodine -- they had the same metallic luster and were the same size and shape as the iodine we had on the shelf, and the flask had a visible purple haze of iodine vapor inside. The odor left no doubt.

At that point, a number of old memories began clamoring for attention. Conversations from back in the NSUSFS days with Jim Ransom and Mark Hyde and old details from Farnham's Freehold and The Anarchist's Cookbook condensed themselves down to one key fact: When you react iodine with concentrated ammonia you get an explosive called nitrogen triiodide. That was what was in the heavy-walled glass flask.

Now, as many of you know, nitrogen triiodide is funny stuff. As long as the crystals stay wet it is fairly stable. When it dries, however, it is incredibly sensitive. The slightest touch can set it off -- or just the process of drying. It has been known to go off because of a fly landing on it. This makes it a popular booby-trap explosive among high-school-age mad bombers, since it is cheap and easy to make and doesn't require fuzing. And since most chemical pranksters that make the stuff just paint solutions of it onto surfaces to make a thin film, it doesn't have a reputation for being as powerful as it is. I heard of one case where someone made a beakerful of the stuff that went off spontaneously and destroyed the fume hood he was working in. The fellow from the campus bomb squad was to tell me of a student from MSU who had tried to make a grenade from the stuff -- it blew off his hand when he tried to throw it.

There were several grams of the stuff sitting in the flask -- enough, by my estimate, to turn the flask into a pretty effective short-range shrapnel bomb. It was starting to get dry around the edges.

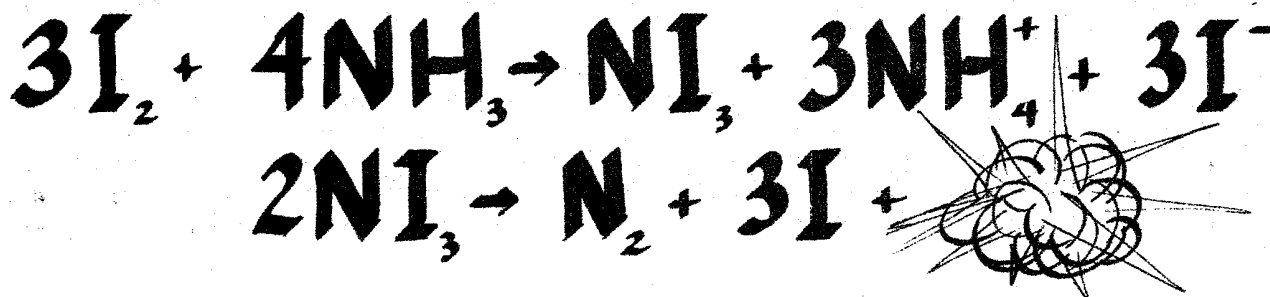
I took a nearby squirt-bottle of distilled water and gently ran the water down the sides of the flask to wet the crystals. Even this slight disturbance was enough to start the flask ping-pong as tiny crystals up on the sides that had had a chance to dry started to go off.

I decided to call my professor and the cops, and await their arrival, from the room across the hall.

* * *

No, it never did go off, which suited me fine. When the cops arrived we added more water and removed the nitrogen triiodide. They kept some (underwater in a sealed container) for evidence. There hasn't been an arrest made and I doubt there will be one, but we are pretty sure of who is responsible. My professor had fired a woman who had for a short time been working in our lab as a graduate student only the week before, for reasons that are most easily summarized by saying he felt she was too emotionally unstable to work with. She still had her keys to the lab. Since whoever did plant the bomb had to have access to the lab, knowledge of chemistry and of where things were kept in the lab, and a grudge against my professor, the triad of motive, means, and opportunity are all present. There is also some other evidence which goes beyond the scope of this article.

As far as what would have happened if I hadn't found it, that is hard to say for sure. There is a good chance it might have gone off spontaneously later that night or the next day. On the other hand, it might have remained there until someone came along and disturbed it -- brushing an arm against it reaching for something else or picking it up to see what it was. It was situated on a heavily-used stretch of benchtop. One thing we know for sure -- nobody else in my lab had heard of nitrogen triiodide before. So if someone else had come in and found it on Sunday or Monday, it could have been very nasty. So thanks Jim, thanks Mark, and thank you, Mr. Heinlein.



Cap'n Al Goes to Sea, Part 3

Al Duester

["Cap'n" Al Duester is an Ocean Systems Engineer at Wood's Hole Oceanographic Institute. This is the third and, he swears, last of a series of articles in which he's been describing his occasional adventures aboard WHOI's research vessels. -- JEH]

On August second I arrived at work as usual, bleary-eyed and in search of hot coffee. I started by handling the usual paperwork and organizational details, trying to remember just what it was that I had been doing before the weekend started. I had planned to finish the contributions I had been working on for both Windyapa and Apatech that evening. As it turned out, I wouldn't have time.

At about three in the afternoon, one of the engineers stopped me as I was walking down the hall and asked if I'd be interested in going out on the Endeavor for a few weeks. Not having yet learned the dangers of saying yes, I admitted interest. I figured that by requiring that it be cleared with the folks I was working for I might be able to pass on the trip and save face.

By the time five o'clock rolled around, the smoke had cleared and I was (gulp!) cleared to go to sea. I was to be a technician for a person I'd never met before, working on an instrument I'd never seen before, and I was leaving Thursday morning at 8 a.m. Rather than go catatonic at that point, I decided to press on as best as I could and retain that option for a later date.

Needless to say, I was very busy for the next two days. Work-wise, I had to learn all about the operation of the instrument (which wasn't working) and pack for the cruise at the same time. Packing alone normally takes three days: One has to get together all of the tools, parts, spares, and supplies needed to repair anything that might go wrong. (It's hard to find an open Radio Shack at two in the morning, out in the Atlantic 100 miles south of Nantucket, when the main transistor in the power control system blows its cookies.) Home-wise, I had to cancel, reschedule, send notes, call friends, pack for the trip, and otherwise make a mess of my plans for August. My worst fear was that I'd never see a tomato out of my garden at all.

By the time Thursday rolled around I was exhausted and just barely managed to drag myself out of bed in the morning. I pulled into work at 7:30 and found out that the engineer who had been working on the instrument still hadn't gotten the problems solved. He finally gave up and let me fix the noise problems that had shown up in the recently-added instrumentation amplifiers. That done, we finally got the instrument packed up and on the ship at 1:30, and the ship finally left the dock at two.

It turned out that only three of the six battery packs that had been packed worked. There were two different styles of ni-cad packs, using C and F cells. The first two days of the cruise I spent disassembling, testing, replacing, and reassembling battery packs. I was finally satisfied that we had enough good ones and we were ready to start launching the instrument. (For good measure I slammed my finger in a door and spent the rest of the night in agony, unable to sleep.)

The instrument package was called SCIMP for Self-Contained Micro-Imaging Profiler. Its job was to dive to a certain depth at high speed, drop one ballast weight, and turn on a laser & 8mm camera system. It would then sink through a column of water taking pictures of the scattered light from the particles suspended in the water. Along the way the built-in CTD (Conductivity, Temperature, & Depth) would be taking measurements. When it reached a second pre-set depth, a second weight would be dropped, and the unit would head back to the surface for recovery. After processing the film would be analyzed for the presence of "salt fingers" -- crystals of salt -- forming throughout the water column. Great and profound statements were to follow out of the laboratory after studies were done on the obtained data.

The primary recovery system used gas-generating explosive squibs that moved pistons to sever wire links that would drop weights. The pistons would also move because of water pressure. Sizing the wires properly allowed us to backup the squib releases with depth actuated release as well. As a third level of backup, corrossible links held the weights on. The links would take about a day to dissolve in seawater.

The first two launchings of the SCIMP were only partially successful. The CTD worked OK and we got profiles of the water column, but the camera and laser had never turned on. I finally traced the problem to a wire that had broken free of its solder connection on one of the PC boards and was intermittent. Both of the first two dives had been in the daytime, and we recovered SCIMP using radio direction finding equipment and binoculars. (The unit was also equipped with dual strobes for visual location in the dark.) With the problems fixed, we got SCIMP ready for the third launch of the day.

It was late evening by the time we got to the launch site. We sent SCIMP on its way and watched it go through its paces on the acoustic telemetry receiver.

It never came back up.

It should have surfaced by midnight. At 2 a.m. we were 200 meters away from it (according to the telemetry) and couldn't get closer. As far as we could tell, SCIMP was stuck down in a thermal and couldn't get back to the surface. The chief scientist decided to leave the area and return the following evening in hopes that the links had dissolved. We didn't think that the problem was with the weight release system. I stayed out on the deck for another hour with the radio gear and binoculars, in hopes that we had goofed in reading the info and that it was really out there. We left behind a locator buoy with flag, radio transmitter, strobe light and sea anchor to mark the location.

We returned the following evening, but still couldn't find SCIMP. The batteries had run down so the telemetry transmitter wasn't transmitting. We searched for a few hours, and failed to locate either SCIMP or the locator buoy. A change in weather had apparently carried them both to never-never land.

The next day, since I had nothing else planned for a few weeks, I caught tonsillitis. For the next week I could hardly talk, found it very painful to



swallow, and looked with horror at those huge, growing, green lumps at the back of my throat. The captain put me on Erythromycin, diagnosed it as tonsils, and said it would take about ten days to run its course. Over the radio patch, the doctor took a guess that I had mono. It puzzled me as I had only been getting four hours sleep a night and was feeling fine other than the throat. Not being able to swallow saliva makes for great fun trying to sleep. Drowning nightmares are much more disturbing when you're on a ship in the middle of a storm.

On the ninth day I was coughing up huge gobs of phlegm that looked like uncooked chicken and drinking ten cups of really hot tea a day. Day eleven found me good as new. In addition to worrying about my survival I had been reading two or three books a day; I read all the sf in the ship's library and almost depleted my own stock. I ended up reading more books on the cruise than I had the preceeding year. After we lost SCIMP, my most important job was to trace a map and plot a few dozen data points on it, so I had plenty of free time to become bored in.

There were some interesting times though. I saw several hundred porpoises and one sperm whale over the duration of the cruise. One time two porpoises rode the bow wave of the ship for about an hour. We also saw an aircraft carrier in the distance. It traveled perpendicular to our bow and was about five miles distant. It was moving so fast that it took less that two hours from the time it was first spotted to the time it disappeared over the other horizon. A Navy chopper came over and took a look to see who we were. They apparently decided we weren't worth bothering with as they only buzzed us once before returning to the carrier.

A NASA plane was involved in a joint experiment with our ship for a few hours. The plane was using a green pulsed laser in a chlorophyll detection system while we simultaneously took water samples and did measurements with wire lowered instruments. Our data was to act as a calibration for the new laser instrument.

There were two other ships involved in the series of experiments we were doing. Both the Knorr and the Oceanus were working with the Endeavor to do many measurements across an area of ocean that exceeded 2500 square kilometers. The object of interest was a Warm Core Ring. A ring is a large eddy of water that splits off of the Gulf Stream and moves off into the colder surrounding waters. The rings range in size from 50 to 200 kilometers in diameter and live from six months to a year before they dissipate. A large amount of money has been allocated for their study over a period of a few years. I'm not sure what we hope to learn from them, other than climate effects.

The Endeavor now has the reputation of a ship that tries to do me in. On my first cruise I almost had a 1500 pound tripod dropped on me; this time it was tonsillitis. On the other hand, the food is always excellent. The cook kept getting flak about his having been a Jewish grandmother in a previous life, owing to the amount of food he tried to stuff us with. I was sleeping so as to miss both breakfast and lunch, which was the only reason I didn't gain weight on the trip. Even so, the constant thought of home-grown tomatoes was with me at every meal.

Epilogue:

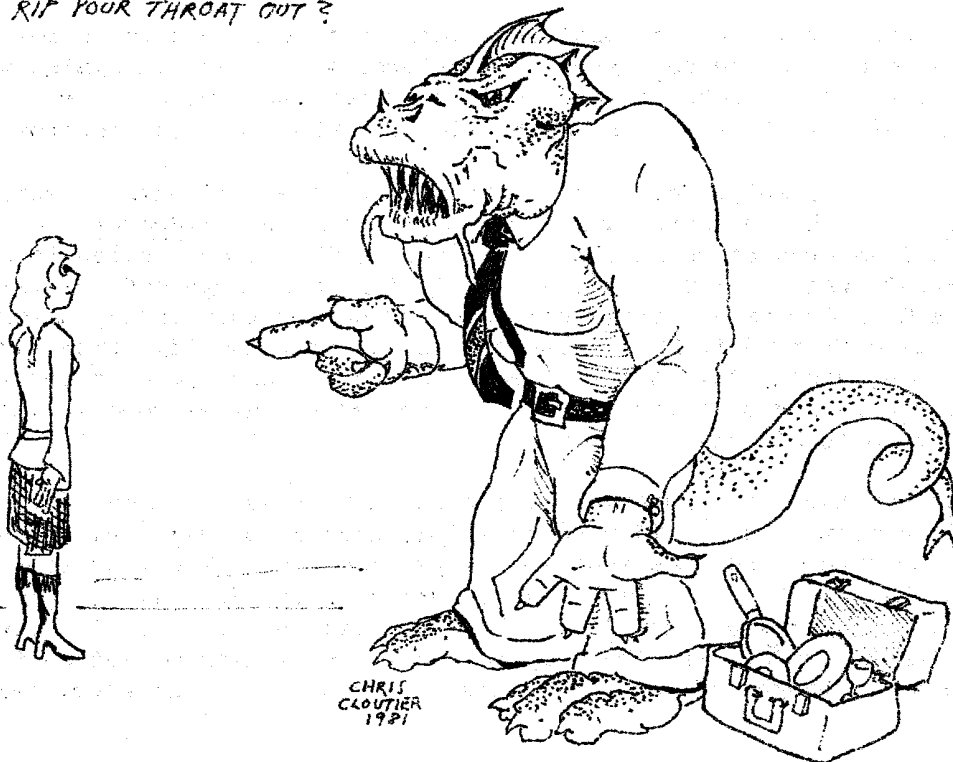
The demise of SCIMP is now thought to have been caused by the breaking off of some of the syntactic foam flotation blocks that had been attached with hose clamps. None of the pressure cases could have flooded and left the instrument working as it was when we left it. It appears that an error in our interpretation of the telemetry made us think we were 200 meters above when we were actually 1650 meters above it.

Telemetry is recorded as a series of pulses sent on a precise one-second repetition cycle. In this case the CTD had sent pressure data back, encoded in pulses. When we were attempting to recover SCIMP, we used the delay from the start of the synchronized one-second period to the beginning of the first data pulse. This is a common procedure for recovery allowing the ship to close in on an instrument by "boxing" -- moving the ship on a box-like course and minimizing the pulse delay to get as close to the instrument when it surfaces as is possible.

But we had lost track of SCIMP for ten to fifteen minutes during the launch, and in that time it had apparently moved fast enough to "skip cycle", that is, to add an extra second to the delay of data reception from the start of the one-second sync cycle. Because the speed of sound in seawater is about 1450 meters/second, SCIMP wasn't at 200 meters, but at 1650 meters, the approximate bottom depth in the region we were working.

The loss amounted to well over \$100K in time and equipment. But aside from SCIMP, the cruise went without failure.

NOW YOU'VE SEEN WHAT A FINE LINE OF
PRODUCTS WE HAVE, WOULD YOU LIKE
TO OWN THEM... OR DO I HAVE TO
RIP YOUR THROAT OUT?



WHAT IS THAT FUNNY ADDRESS IN THE COLOPHON, ANYWAY???

A Non-technical Explanation of Electronic Mail on UNIX Systems

by
Gail Bayley Hanrahan

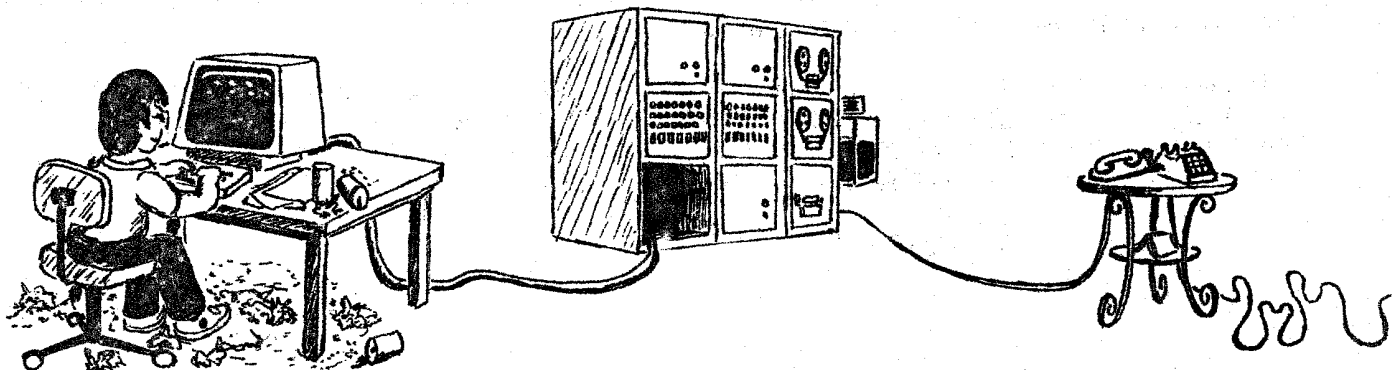
I'm going to attempt to explain what that funny address means. This explanation is for the people (yes, there are some) who don't work with computers, aren't familiar with computers, and aren't sure if they want to be familiar with computers. In other words, I'm going to simplify everything I possibly can.

The "name!name" notation is how electronic mail addresses are specified on UNIX systems. "Unix?," you say. "What's that?" (Well, some of you say that). Although the history of Unix systems has been discussed in many computer trade publications, it hasn't been discussed in Pyro since Mike O'Brien was writing his column (in issue four, or thereabouts).

What is UNIX?

In 1970 - 1971, Bell Laboratories dropped out of a large project to develop a timesharing computer system called "Multics." Two people, Ken Thompson and Dennis Ritchie, were particularly interested in having a timesharing system, and Bell Labs' abandonment of Multics left Thompson and Ritchie without one. So they decided to write their own system on a PDP 7. They called their system "Unix" -- a pun on "Multics."

By 1972, Unix had become fairly widespread in the Bell System companies, mostly because of the capabilities offered, and the system's flexibility. Educational institutions began to request copies of the operating system, which they received for an extremely low license fee. From there, Unix began to spread to commercial companies as students graduated from universities, entered the working world, and hailed the joys and benefits of Unix.



UUCP

One reason that UNIX became so popular so rapidly is the existence of UUCP (short for Unix to Unix CoPy). UUCP is a package of programs that allows files to be transferred from machine to machine, most commonly over telephone lines. Most other networks require expensive equipment and/or dedicated phone lines. UUCP can be used over ordinary lines, dialing during hours when the rates are relatively inexpensive. UUCP has other capabilities, but I'm going to deal with UUCP only as it pertains to electronic mail.

Each computer or site (a collection of computers at a particular place) has a list of other machines that it can call up on the phone. This list is the list of "direct connections."

An "indirect connection" occurs when one site calls another, transferring files or mail, and that second site calls yet another site, passes on everything for the third site, and so on. Thus, the first site is connected indirectly to the third site through the second site. There is no theoretical limit on the number of connections that can be made, although there are practical limits. In practice, the smaller the number of computers that data has to pass through (i.e., the shorter the path), the better, because then your message gets to the recipient quicker.

UUCP actually logs on the other computers just as you or I would at a terminal. However, when UUCP logs on to another computer, a special program is run that is the complement of the calling program. These two programs "talk" to each other, and transfer files.

To send mail to a person with an account on the same computer I am on, I send it to that person's "login id". (A login id is the name the computer knows you by). If I want to send mail to someone who has an account on another computer, I have to know, in addition to the person's login id, the name of the computer their account is on, and whether or not the computer I am on calls that other computer. If it doesn't, I have to know what computer does call the one I want to send to, and how to get to it. Sound confusing? Let's try and clear this up a bit.

I'm working for Calma Company here in San Diego. There are lots of computers here, but the one that receives and sends mail to other computers is called "calmasd" (short for Calma San Diego, of course). My login id on that computer is "gail." So the

```
calmasd!gail
```

in that funny address means only "the login id 'gail' on the computer 'calmasd.'" This is my electronic address. The exclamation point (generally called "bang", a term I'll use henceforth) is used to separate the parts of the address, and the last part of a UUCP address is always the login id.

Calmasd has connections to many computers. The UC San Diego Computer Science department VAX computer, sdcsvax, is the "largest" computer calmasd talks to directly. By "largest", I mean that sdcsvax has many connections to other sites that have many connections. This is the next step in that address

```
sdcsvax!calmasd!gail
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Sdcsvax is probably the best known computer that calmasd is connected to, and that's why I use it in my address -- so that other people have a better chance of figuring out how to send mail to me.

The rest of this address

{ihnp4,decvax,ucbvax}!...

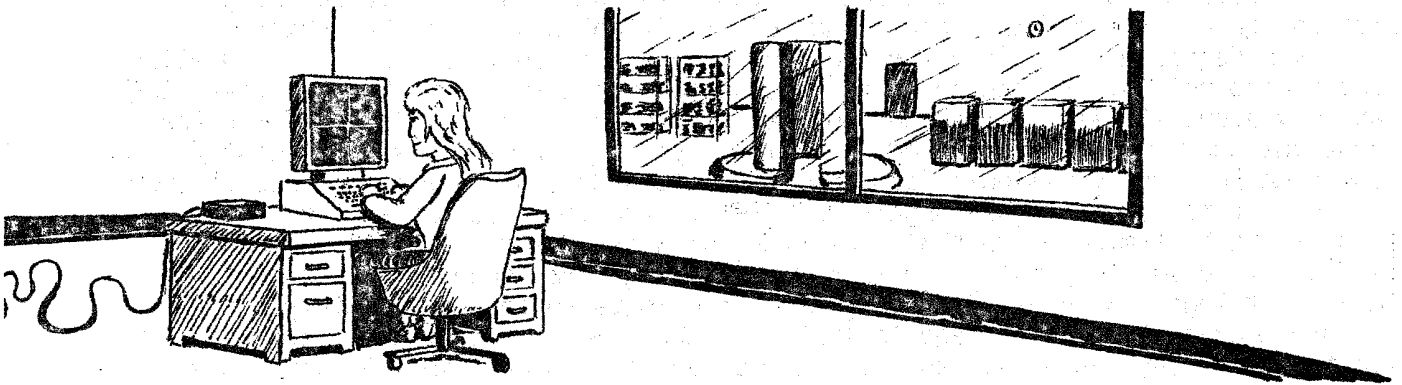
is more of the same stuff. The notation with the braces and names separated by commas is a shorthand for "choose one of these." Ihnp4 is a computer at AT&T in Illinois, decvax is one of the DEC Unix Engineering Group's VAX in New Hampshire, and ucbvax is one of UC Berkeley's computers.

I and many other people routinely use these and several other well-known sites with many connections for routing mail. These sites have expressed a willingness to support the transfer of mail, in part by establishing many connections, and also as part of an established company policy. Such a policy gives a site a certain "network presence", allowing them to more easily hire and retain people with UNIX experience. A large number of UNIX people do use "network presence" as a criterion in changing jobs.

Some people have started a project to "map" the UUCP connections. This project is all run with volunteer labor, and donated computer resources. If you are the administrator of a UUCP site, you are requested to mail information on your site to a certain address (cbosgd!map -- cbosgd is another AT&T site, this one in Columbus, Ohio). The information for each site includes the name of the site, the name, postal address, and electronic address of the site administrator, and a list of direct connections. All the information is gathered up, packaged in a particular format, and then distributed.

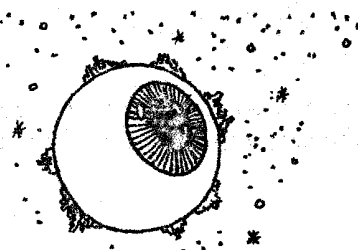
Many sites have programs that read the UUCP map database and determine the mail paths to other systems. These programs are not standard on Unix systems, and require a fair amount of time and expertise to install and maintain. The map itself is very large (over 750,000 characters of data).

The UUCP map is distributed via Usenet, a collection of machines that run "news," a kind of bulletin board system. Usenet is a subject large enough for its own article, so I won't go into it more, except to say that Usenet was originally about 20 computers running UNIX, but now there are over a thousand computers, some running UNIX or UNIX variants, others running other operating systems.



THE Urban Eyeball

Part III: the Spring Sky



Greg Ruffa

After the memorable spectacle of the winter sky, with its magnificent stellar display, the night sky of spring seems quite barren. Few of the stars visible at this time match the brilliance of those seen along the Galactic band just a few months earlier. Indeed, even the number of visible stars seems diminished.

The reason for this is that we are no longer looking into the Milky Way, but almost straight up out of it. From the middle northern latitudes, the plane of the Galaxy is seen to lie nearly on the horizon. We are now looking through the few hundred light-years of the Galactic disk that separate our Solar System from intergalactic space. There are simply fewer stars to be observed in that direction. (The density of stars in the disk does not cut off abruptly, but trails off in much the same way that the Earth's atmosphere fades into open space. So the disk doesn't have a specific width, but effectively "ends" within 500 light-years of its plane of symmetry. This gives the disk of the Milky Way roughly the proportions of a stack of two phonograph records. We ourselves are quite close to the plane of symmetry at present.)

The brightest star in this sky is one of the best known and lies in a constellation with one of the strangest-sounding names. That star, *Arcturus*, is found in the constellation *Boötes*. (The umlaut, fading from contemporary English usage, indicates a syllabic break between the "O"s.) This name has been in use for at least 2500 years, as it appears in the *Odyssey*, though it was probably originally applied only to the star Arcturus. It may have derived from *bois óthein*, the Greek for "ox" and "to drive", intended to refer to the Driver of the Wain or Wagon, the asterism we now call the "Big Dipper." Alternatively, the name may have come from *boetés*, meaning "clamorous," as the Driver's shouts to his team would be.

Arcturus, which comes from *arktouras*, the "Bear-guard," for its proximity to Ursa Major, is an orange giant star and the fourth brightest in our skies. It lies 37 light-years away; it is about 25 times the size of our Sun, 115 times as powerful, and has four times the mass; its surface temperature is 4200 K (7100° F.). Arcturus has the greatest proper motion (that is, apparent angular motion against the stellar background) of all bright stars: it has shifted nearly a degree-and-a-half since classical times. It is moving at about 90 miles per second relative to the solar neighborhood; by contrast, our Sun is travelling at only about 12 miles per second in that reference frame. It is estimated that Arcturus became visible about half a million years ago, will make its closest approach to us some millenia from now, and will fade from view in another 500,000 years. It follows an orbit highly inclined to the Galactic plane, typical of a star which formed in the "halo" of material surrounding the Galaxy beyond the disk. Arcturus enjoyed popular fame when its light was focused on a photocell used to trigger switches activating the floodlights to open the Century of Progress Exposition in Chicago in 1933. At the time, the star was thought to be forty light-years away: thus the light reaching Chicago in 1933 would have started on its way during the Columbian Exposition of 1893 in that same city.

Spica is the luminary of the constellation Virgo, the Maiden of the Harvest in some accounts; the star's name descends from *spicum*, the ear of wheat which the Virgin holds in her left hand. *Spica* is a blue-white star some 275 light-years from us, which shines with some 2300 times the power of the Sun. It is a massive spectroscopic binary. Eighty percent of the light comes from the primary star, which has eleven times the Sun's mass and eight times its size; this star also pulsates with a period of about four hours. The lesser companion is about seven times as massive as the Sun and about four times as big. This pair is separated by only about 11 million miles and forms a grazing eclipsing binary, in which, as seen from Earth, one star partially blocks the light from the other as it passes before it.

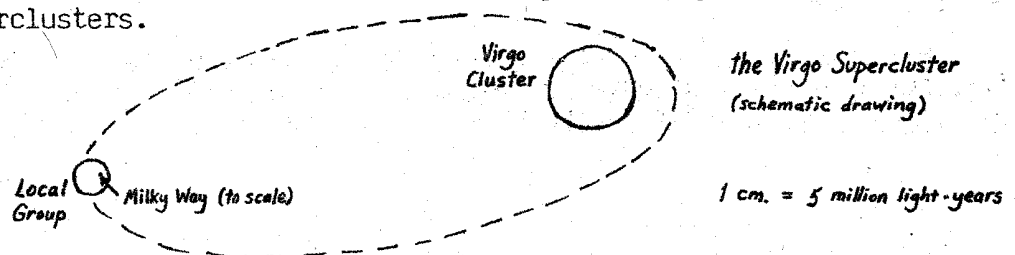
A portion of the constellation *Centaurus* is visible from the southern United States. It has been viewed as a Centaur at least as far back as classical Greece. It is taken by some to represent Chiron, the son of Chronos and the sea nymph Philyra and the teacher of such heroes as Achilles; he is also the legendary inventor of the constellations. The third brightest star in the skies of Earth, Rigel Kentaurus, more popularly known as Alpha Centauri, is barely above the horizon in the extreme southern United States, but can be seen at very low elevation from Hawaii or Puerto Rico.

Gacrux marks the top and northernmost star of the Southern Cross, *Crux*. This region was considered part of Centaurus by the ancients; the present constellation is an early Seventeenth Century invention. The name of the star is a contraction of Gamma Crucis. *Gacrux* is a red giant star some 220 light-years distant and about 900 times as luminous as the Sun.

Since our line of sight is nearly perpendicular to the plane of the Galaxy, we are looking nearly along the rotational axis of the Milky Way. We may therefore mark on the chart the points about which our Galaxy appears to turn. Not far from the zenith is the *North Galactic Pole* (NGP); it is so called because it is the Pole visible from the northern continents. Otherwise, the designation is peculiar: the Galaxy rotates clockwise about this Pole, just contrary to the convention applied to planets and stars.

Out in this direction is found the *Virgo Cluster of Galaxies*, a gigantic congregation of which about 3000 members have been identified. It is the closest cluster of galaxies to us, being about 40 million light-years distant; this assemblage is about five million-light years across. In comparison, we are part of what we call the Local Group, a roughly spherical cluster about $2\frac{1}{2}$ million light-years in diameter containing about twenty galaxies. M31 (the Andromeda Galaxy), Maffei I, and the Milky Way are the dominant members with hundreds of billions of stars each (all are spiral galaxies); the rest are dwarf ellipticals, one dwarf spiral, and irregular galaxies, each possessing twenty billion stars or less.

It has recently been determined that these two collections are but part of a yet larger array called the Virgo Supercluster. This tremendous grouping hosts more than 10,000 galaxies and forms an ellipsoid some 40 million light-years across, in which we in our Local Group orbit at the periphery. It appears that the Universe contains thousands of clusters of galaxies, generally assembled in turn into superclusters.



In the previous installment, the device of the Hertzsprung-Russell Diagram was introduced. At the time of its invention, the means by which stars generated their energy was not well understood. It was generally thought that stars released energy through gravitational collapse, turning potential energy into internal heating of their constituent gases and thereby radiating that energy into space. A typical star would thus start off very large and hot and would steadily shrink and cool as it aged. It was found that the Sun, at its present level of power, could exist for about thirty million years. By the early Twentieth Century, however, geology and paleontology already recognized that the Earth was at least a billion years old, fomenting terrific disputation with astronomers.

The emergence of quantum mechanics in the first third of our century and the consequent development of nuclear physics brought about a breakthrough of insight into stellar processes. It became clear that thermonuclear fusion, in which lighter nuclei are combined into heavier ones with a release of energy, could readily provided the power source to sustain stars for up to many billions of years.

The significance of the groupings in the Hertzsprung-Russell Diagram now stood revealed. Stars form from the interstellar medium of gas and dust grains with various initial masses; when sufficiently high densities and temperatures are reached at the center of the blob of matter, fusion commences and the star begins its life. If the mass is less than about 0.06 that of the Sun (or about 60 times that of Jupiter), the core doesn't manage to provide conditions for fusion to be initiated; if the mass is more than around 60 times the Sun's, the star begins to radiate before more material can fall onto it and the residual gas and dust are blown away. The most massive stars start off very hot, brilliant, and blue-white, while the tiniest stars are much cooler, dim, and red. The "main sequence" is thus a diagonal array on the Diagram where stars begin "life" and are arranged by their initial mass.

How long a star may sustain itself depends on that mass. Stars emit radiation at a rate that increase with roughly the fourth power of their mass, yet their available fuel increases only about proportionally to their mass. Thus a very massive star, such as Rigel or Deneb, can stably convert hydrogen into helium for only a few million years, while the Sun can do so for around eight billion years and the smallest red dwarfs can continue for hundreds of billions of years. About ninety percent of a star's lifetime is spent on or near the main sequence, until the hydrogen in the core has almost entirely been transformed into helium. The star then faces its first life-crisis.

The energy which the star produces by fusion is the only thing that keeps it from caving in under its own gravitation. When the hydrogen hot enough to fuse is gone, a potential disaster is at hand. The outer layers of the star start to fall inward and the interior heats up from released potential energy. If the core can get hot enough, the helium will begin to fuse into carbon (and other elements) and the star gains a reprieve. Its structure settles down again, but in a way that makes the star brighter, larger, and cooler at its surface (the available radiating surface area grows faster than the amount of power to be emitted, so the surface temperature falls). The star has become a giant or supergiant star.

Gianthood is a rather short-lived phase, since helium fusion is less efficient a process per unit of fuel mass than hydrogen fusion. The star can only spend a few percent of its time in this fashion before it is in trouble

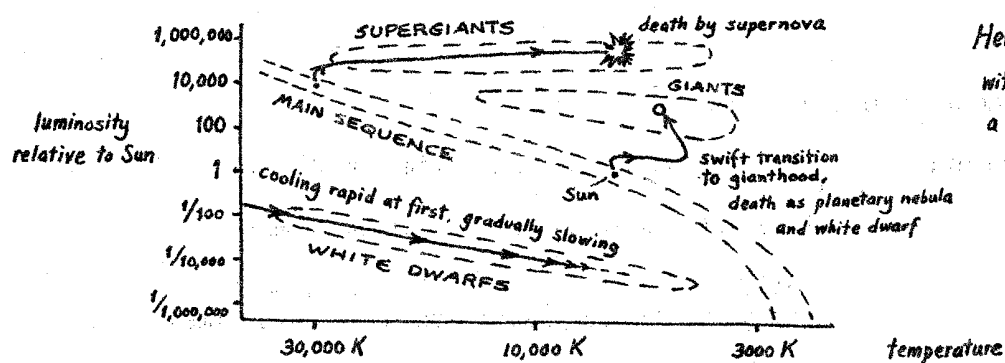
again. If the core can get still hotter during the next collapse to start fusing carbon, the star's life is spared once more. But this stop-gap is even less effective than the previous one, so the star is soon sent tumbling down once more. A sort of convergent series of such phases occurs if the star is massive enough, each time producing heavier and heavier atomic nuclei.

The dead-end is reached when the core produces iron. These nuclei cannot be fused into anything heavier without the addition of energy. Since the star has needed sources of energy to keep itself going, it finds itself a terminal case. The next (and final!) collapse triggers a violent disintegration of the iron core into fundamental particles, releasing stupendous energies in a fraction of a second "flash." The star is blasted into an expanding gas cloud, briefly a billion times brighter than the Sun: this is a supernova. Supernovae in other galaxies have been spotted with large telescopes as much as several hundred million light-years away.

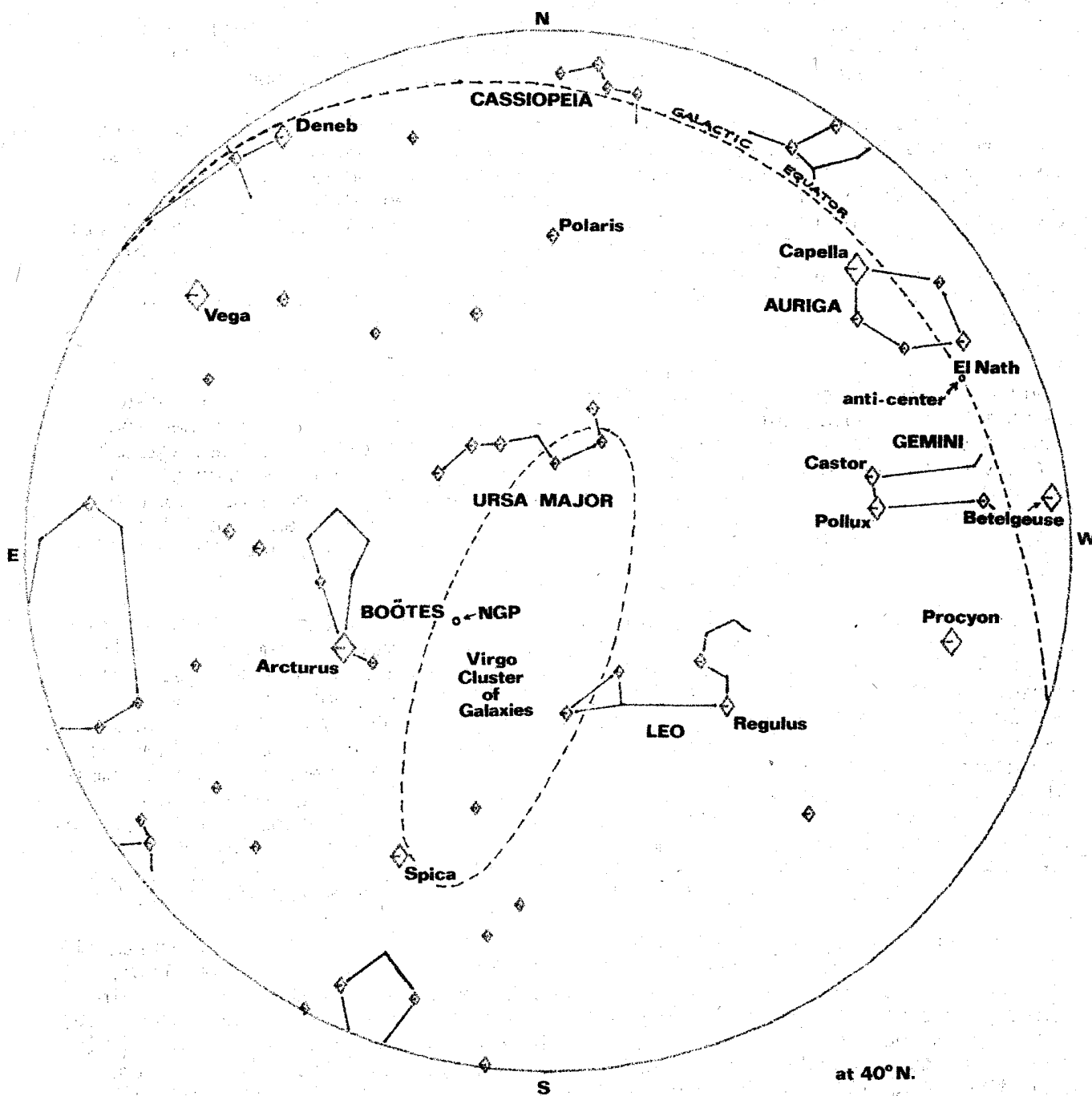
Stars of at least eight times the Sun's mass perish in this fashion. The star's core is thought to collapse into a totally inert object. If its mass is no more than about three times that of the Sun, the core becomes a neutron star, a dead structure of nucleons and fundamental particles supported against gravity by the degeneracy pressure of its neutrons (much in the manner that a white dwarf remains stable, as described last time). If the core mass exceed that amount, however, it is believed that no further process can arrest its collapse under gravity: it becomes a black hole; this is presently thought to happen rather rarely, though.

If the star is less than eight times the mass of the Sun, it cannot avail itself of the alternative energy sources discussed above. At some point in the sequence, its core will just not get hot enough to commence the next fusion phase. By a process not yet completely understood, the giant star becomes gently unstable and blows off its outer layers in a smoothly expanding "bubble." As seen from a distance, this spherical cloud looks like a ring and is known as a planetary nebula (they looked like disks in early telescopes, resembling remote planets); the most famous example is, in fact, called the Ring Nebula. The denuded stellar core is a white dwarf, like Sirius B, for instance. Its structure will be preserved, but, since it no longer produces energy, it will become cooler and fainter over billions of years, much as normal stars were once thought to do. On the Diagram, its position will slip to the right and downward with time.

Clusters of stars in our Galaxy can thus be dated through this understanding of stellar evolution. A group like the Pleiades, with many blue-white stars, must be no more than a few tens of millions of years old, or those stars would already have ceased to exist. The Hyades, having no intact stars more than about three times the Sun's mass, must be a few hundred million years old. The couple hundred globular clusters surrounding our Galaxy only have stars less massive than the Sun and thus are probably around 10 billion years old, implying that those clusters formed about the same time as the Milky Way itself!



Hertzsprung-Russell Diagram
with evolutionary paths of
a massive star and the Sun
(very schematic)



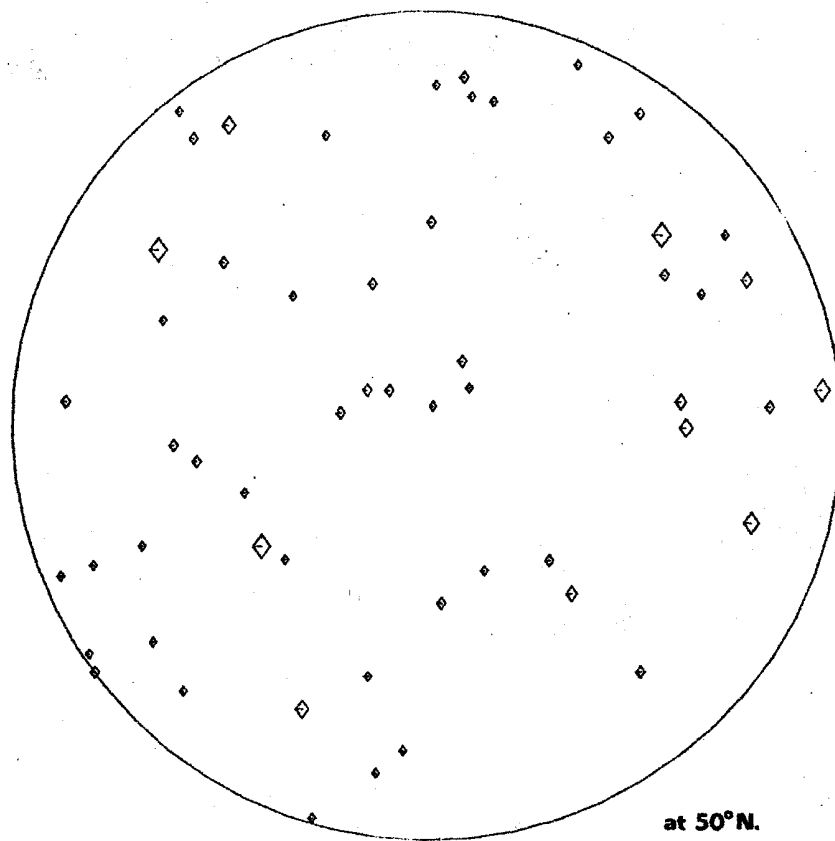
the sky at twelve hours sidereal time

it appears as shown at:

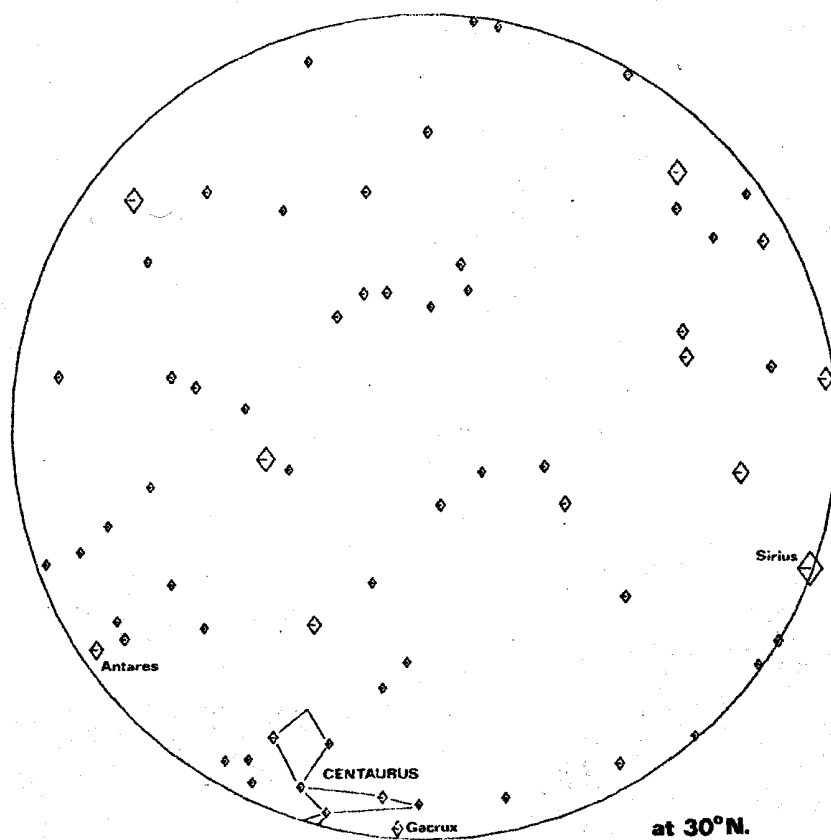
11:20 PM local standard time on 1 April

10:20 PM local daylight time on 1 May

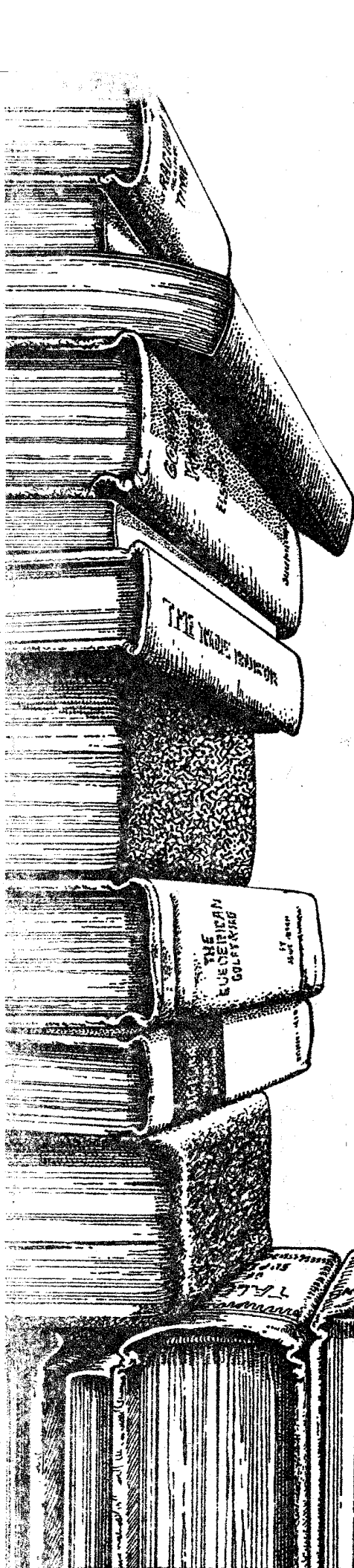
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(may not be completely dark at this time)



at 50°N.



at 30°N.



Beyond the Blurbs

Pyro looks at books

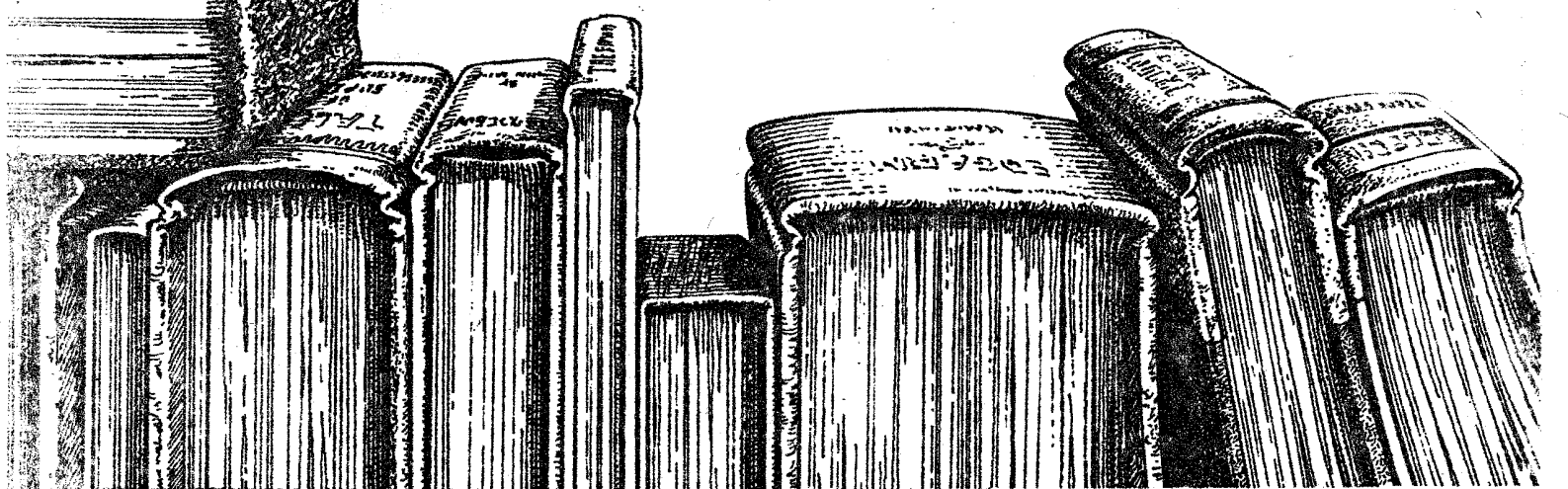
The Peace War
by Vernor Vinge
Bluejay Books, \$16.95

reviewed by Jamie Hanrahan

You'll probably remember Vernor Vinge as the author of True Names, a delightful novella about near-future nethacking that didn't quite get the recognition it deserved, due mostly to limited distribution and publicity. Even its detractors admitted that it showed that Vinge had enormous potential. I'm happy to report that The Peace War fulfills that promise and establishes Vernor Vinge as a first-class writer.

The scenario in brief: A decade or two from here-and-now, Paul Hoehler, a researcher for a small defense contractor, provides the theoretical key which leads his employers to invent the "bobble"... an impregnable, perfectly-reflecting, permanent force field. (Much like the ones Heinlein used in Between Planets, except that there's no way to turn these off.) With sufficient power bobbles can be cast around anything, anywhere in the world, condemning those trapped inside to slow death by asphyxiation.

Hoehler's boss, Hamilton Avery, sees the bobble as an important weapon and tells no one, not even the government. The company builds a long-distance bobble generator, entombs military installations all over the world, and proclaims a new world government, the "Peace Authority". Nuclear war almost breaks out, but thanks to the bobbles it's a wet firecracker. The Authority declares that war and the things that lead to it will no longer be tolerated anywhere on the planet; the world, saved from the long-dreaded holocaust and having no other choice, grudgingly accepts "the Peace".



But in order to preserve the peace (and themselves), Avery and his group impose heavy restrictions on the rest of the world. Small, weak local governments are permitted, but only so long as they defer to the Authority. All weapons other than small arms are banned. So are bioengineering research and anything requiring or generating significant amounts of power, electrical or otherwise. The Peace Authority, confident of its good intentions, will embobble any site which is even suspected of conducting Banned research or possessing Banned technology.

Some fifty years later, Hamilton Avery is still hunting for Paul Hoehler, who disappeared into the hills of California soon after the coup. Hoehler has become one of the leading theoreticians behind the "Tinkers", a worldwide, informal network of techies who make and sell all manner of low-power, high-tech electronic gadgets, which the Peace has seen no reason to Ban. Avery begins to regret that decision when he learns that Tinker microelectronics technology has far surpassed the Authority's. He is convinced that Paul Hoehler, who invented the bobbles, is still alive and may find a way to cancel them -- or to cast bobbles of his own, or to mount an effective attack against the Peace in some other way. Finding and neutralizing the Tinkers, and Hoehler in particular, becomes an obsession with Avery.

Meanwhile, Hoehler has noticed that he's getting old and has adopted Will Wachendon, a brilliant young refugee from Los Angeles, as an apprentice. Will soon cracks some of the problems that Paul has been working on for years; among other things, he taps into the Authority's communications and disables their reconnaissance satellites. Hoehler's fears are confirmed as he learns of Avery's plans to capture all the Tinkers he can find and portray them as public enemies so that their former customers will inform on the rest. Hoehler sees this as further evidence of Avery's growing megalomania; soon, he fears, Avery will be no better than any other dictator in history. Overthrowing the Peace moves from something that would be nice to do someday to an overriding necessity. But how?

The answer is built up slowly and gradually. I don't want to spoil any of the fun, so I won't reveal any of it here. There are surprising twists all through the book; defeat is wrested from the jaws of victory and vice versa at least four times, as each side reveals previously-unseen (but well-founded) strengths and weaknesses, both in equipment and in personnel. At first glance The Peace War may seem to be yet another retelling of the old "revolution" story that's a staple of sf, and in a way it is, but Vinge has come up with enough variations on the theme to make it more than worth your time.

This is a hard sf story (and, yes, engineering fiction) in the best tradition of the genre. The tech here is flawless: It's inventive and great fun to read about, yet reasonably derived from here-and-now (I hope I live long enough to do some "symbiotic programming"), and the background is correctly filled with the sort of widgets that you could expect to see, given what's in the foreground. Many of these are quite unnecessary to the plot, but they add a great deal of consistency to the texture of Vinge's world.

But even though it's on stage for most of the story, the tech is in its proper, supporting role; it never steals any scenes. Vinge never delivers a lecture nor explains anything that doesn't absolutely have to be explained. (In particular, I was most appreciative of not having to wade through a lot of pseudophysics "explaining" the bobbles; such passages, while a common staple of hard sf, only get in the way -- at best.) The story is centered around the people, not the technology they control, and Vinge justifies his characters' actions and motivations just as carefully as he builds his technology.

And he doesn't hit you over the head with a Message, though I think some cautionary parallels can be drawn between the "purely offensive" bobbles and the promised "purely defensive" nature of the Strategic Defense Initiative.

To sum up, The Peace War is, quite simply, the best novel I've had the pleasure to read in a long time. It was originally serialized in the May through August '84 issues of Analog; this makes it, in case you weren't sure, eligible for the Hugo for Best Novel of 1984 (to be awarded at Aussiecon). I'm encouraging everyone I know to read the book and, if they like it, vote for it; efforts like this deserve the strongest congratulations fandom can give. If you can't bear to part with \$17, find the Analog back issues and buy those instead, or wait for the paperback that should be out in June (but you'll be missing a spectacular cover by Tom Kidd and a first-rate printing and binding job by Bluejay Books). I'm telling you, it's worth it. If you don't read it now, and it somehow manages to miss the award, you'll kick yourself forever afterward for having missed the chance to help it over the top.

The Revolution from Rosinante,
Long Shot for Rosinante, and
The Pirates of Rosinante [read them in that order]
by Alexis Gilliland
Ballantine, \$2.50 each

reviewed by Jamie Hanrahan

Rosinante is, first, an asteroid, and second, the name of an artificial habitat ("mundito", Spanish for "little world") erected nearby. These books are the story of the final phases of its construction, of its unexpected population boom (2500 political exiles from Texas (you heard me) and, later, 2500 Oriental mates therefor), of its declaration of independence, of the defense of its "borders" and interests... and of the political intrigue among its enemies. Its enemies are many and varied, and include the North American government from which it ceded, several officers who have recently mutinied from the space-Navy of that same government, the "Contra Darwin" (a radical right-wing group on Earth), and a group of radical leftists among its own population... and many others too numerous to mention. This keeps life for the mundito's residents, and particularly its governor, interesting.

These books are the oddest combination of deadpan (Gail said "boring") prose and startling events. Gilliland relates the assassination of the governor of Texas via a stolen cruise missile (you heard me) in the same flat tones that he uses to describe the place settings at a ceremonial dinner during which absolutely nothing of importance takes place. You may find this to be refreshingly different, whimsical, tedious, or frustrating, depending on your point of view. It can be argued that this approach mimics real life more closely than traditional narrative prose -- sort of like a dramatic movie with no dramatic music in the background. It kept me reading, which is the important thing. You may well have a different reaction.

There are lots of fascinating bits here. A small sampling:

In one scene three sentient computers have a discussion at a conference table, via viewscreen -- one showing the face of its former owner (a doctor who specialized in gene modification; the computer is carrying on her research, holds all of her records, and so is the frequent target of "assassination" attempts by agents of the Contra Darwin), one appearing as a mysterious Lady Dark, and the third displaying the visage (and speech habits) of Humphrey Bogart, complete with trench coat and fedora. What is particularly amazing in retrospect is that, in context, this scene

seems not at all remarkable.

A Marxist activist aboard Rosinante prints his propaganda on a mimeograph machine; Ghu only knows how he shipped it up to the asteroids or where he gets stencils and ink.

A nearby mundito is destroyed by its (unionized) workers over a beef with management. Rosinante avoids such problems. Barely.

Good tech abounds, but Gilliland's flat prose rubs it in your face: "The Shield of Don Quixote was fashioned in this manner. The front of the shield was an array of tetrahedrons made from the spun beams salvaged from the main frame of Mundito Don Quixote. It measured 22 by 25 by 0.80 kilometers. On the outer face of the shield were mounted nine fixed rocket engines..." That's part of the narrative, not dialogue nor a quote from a report. It turns out that these details, unlike those of the aforementioned banquet, are important, but the style doesn't make that at all obvious. The Shield, by the way, was built to protect Rosinante from a nuclear-tipped missile. The missile was launched by a Contra Darwin agent from the Earth-Moon L4 point during a mutiny aboard several ships of the North American Union...

As I said, life aboard Mundito Rosinante is interesting, in the sense of the old Chinese curse, "May you live in interesting times". Things are so tangled that Gilliland begins the second and third books with a rerun of the last third or so of the previous book, but told from the viewpoint of one of Rosinante's enemies. Just as well, for otherwise you'd have no idea why all those people were doing all those apparently inexplicable things.

I've no idea whether to tell you to buy these crazy books or not. I liked them, but in spite of the style rather than because of it. This is a shame, because the stories are excellent. A compromise: Borrow a friend's copy of the first book; one thing I can say for sure is that if you like it, you'll like the rest. I'll make no bets on the first one, though.

The Faces of Science Fiction

photographs by Patti Perret, introduction by Gene Wolfe
Bluejay Books, \$11.95

reviewed by Danny Low

This book is a collection of black and white photos of sf authors with accompanying text written by them. The pictures are "environmental portraits". (For those not familiar with the term, environmental portraits are portraits that show the person in an environment that is supposed to indicate something about the person's personality or profession, as opposed to studio portraits that have a neutral background.) The list of authors pictured is large, but not comprehensive: Some prominent people, such as Robert A. Heinlein, are missing. On the other hand, the book includes some who are very unexpected. Alice B. Sheldon (who writes as James Tiptree Jr.) is one of these. This is only the second published photo of her that I know of.

I am only acquainted with a small number of the authors in the book, and I am not a professional photographer, so I showed the book to various local fans who between them know most of the people in it. One of them, Ctein, is a professional photographer. The general consensus was that the photographs were okay for family snapshots, but for a professional photobook many of them are pretty bad, and the

best are only technically competent. A few suffer severe technical problems; for instance, the picture of David Brin makes him look deformed. Several of the writers -- Marta Randall, for example -- would not be recognizable in person from their photos.

Another problem is that there is no index or table of contents. This would not be so bad except that the authors are presented in no discernable order. It is certainly not alphabetical.

On the whole, you would do better to subscribe to LOCUS and look at the pictures of the authors that are taken at the various conventions.

[I got two conflicting reviews on The Faces of Science Fiction. The only reasonable thing to do is to run both of them. Take your pick of opinions! -- JEH]

The Faces of Science Fiction

reviewed by Astrid Anderson Bear

An appropriate subtitle to this book would be, "The family album of science fiction, with weird notes by all the cousins."

After Patti Perret had completed a handful of portraits of sf writers, she got a contract from Jim Frenkel at Bluejay Books. She promptly jumped in her car and took off across the country to photograph about 75 more writers in their homes. Therein lies the charm, I feel, of this collection of photos. Rather than potentially stiff shots in a studio atmosphere, setup at a convention to get lots of writers in one place, Patti went to the various Mohammeds. One is allowed to examine the surroundings writers choose to immerse themselves in and catch them relaxed -- at home in their settings.

Since I was able to watch her work while she was photographing Greg Bear and David Brin, I can respect the achievements of her traveling studio all the more. Most of the pictures are very good, and some are truly wonderful, even without knowing who they are of. This enriches the impact of the images.

An elegant, high-cheekboned woman sitting on the raised hearth of her fireplace, contemplating a newspaper -- the picture is worthy of the old Life magazine. To then see that it's the elusive Alice Sheldon/James Tiptree Jr. is a delightful shock.

More high cheekbones, male this time, looking like a Jamie Wyeth painting -- and it's Michael Bishop. Isaac Asimov, tuxedoed, standing on his balcony overlooking New York City. C. L. Moore dreaming in an overgrown walled garden. Ray Bradbury in jogging shorts in a cluttered basement, masks peering from the rafters, books stuffed everywhere. Algis Budrys in his basement, and what is he doing with all those bicycle handlebars in his rafters? Frank Belknap Long, elfin in a forest. Joe Haldeman with a ghost trapped in the smoke of his pipe. For downright strange and eerie, nothing matches Keith Laumer peering suspiciously from the open door of a junked-out Mercury Cougar, surrounded by his collection of over 40 more of them.

Each photo (82 total) is accompanied by a personal statement by the writer in question. Some are brief, some obscure, some pretentious. They're generally worth reading.

The book has one flaw -- no index or table of contents, which makes it difficult to find people. Also, a notation of the town and state in which each writer lives would have been a nice enhancement.

All in all, the book is worth the price.

[I am reminded irresistibly of one of Professor de la Paz's lines from The Moon Is A Harsh Mistress: "I find these conflicting opinions very conflicting." -- JEH]

Entropy, A New World View

by Jeremy Rifkin with Ted Howard

reviewed by Jeff Swycaffer

Not all "Limits-to-Growthers" are scientifically illiterate, or subliterate, but it is instructive to be reminded that many are. Rifkin's book is a long, often poetic reminder that energy cannot be transformed from one form to another without a minute loss to entropy. Ta da. Is it actually necessary to take up 297 pages, including 28 pages of documentation and footnotes, to tell us that entropy (or waste heat, if you prefer) is the beneficiary of a small fraction of every energetic process?

Rifkin makes this not a discovery, but yea, a revolution. The awareness that entropy is all-powerful, he tells us, will become a new World-View, ascending in its place to replace the Pythagorean, the Christian, and the Newtownian world-views that have all had their day on Earth. If it is possible to be proclamatory about the transcendence of the fact that no process can ever be 100% efficient, Rifkin manages.

The energy incoming from the sun is not equal to the energy we consume from non-renewable resources. So? No process can ever be perfectly efficient. So? The question isn't the awareness that we can't grow forever; the question is, how long can we continue to grow? How narrow is the critical zone? If we were within, say, six years of exhausting all of the world's reserves of petroleum, then a panicky desperation would be called for: But we are not. Rifkin does not concern himself with the issue of how long, or how much, or how far we can continue; he simply states at great length that we can't continue forever. This is an awareness to replace the Newtownian view of an organized cosmos? I doubt it.

There are limits to growth inherent in nature: Phosphorous is an essential element in living processes, and is probably never going to be renewable, only recoverable. There is only so much energy in the solar system, and once the solar system has a uniform and constant temperature throughout its extent, that's it. But these facts have little to do with our energy planning for the next twenty, fifty, or one thousand years.



MESKLINITE KHARTOUM

Lights of Known Space

David Levine

[Dave posted this series of jokes based on Larry Niven's (and Jerry Pournelle's) books to the sf-lovers newsgroup on Usenet. It's a good thing Gail spotted and forwarded them... I guess... -- JEH]

Q: How many Pierson's Puppeteers does it take to change a lightbulb?

A: None, it's too dangerous. They'll hire someone else to do it.

Q: How many Thrintun does it take to change a lightbulb?

A: 17,002. One to discover a new slave world, 17,000 to enslave it, and one to direct the actual operation.

Q: How many Grogs does it take to change a lightbulb?

A: None. You'll do it for them.

Q: How many Pak Protectors does it take to change a lightbulb?

A: Three million and one. One million to fight a huge, senseless, bloody war over who should change it, one million to research the nature and location of the lightbulb, one million to build the tools, and one to change the lightbulb.

Q: How many Kzinti does it take to change a lightbulb?

A: None. Kzinti can see in the dark!

Q: How many Kdatlyno does it take to change a lightbulb?

A: What's a lightbulb?

Q: How many Motie engineers does it take to change a lightbulb?

A: Only one, but you won't recognize it when she's done with it...

Q: How many Trinocs does it take to change a lightbulb?

A: Three. One to change the bulb, one to be suspicious of the one changing the bulb, and one to be suspicious of the one being suspicious. The one changing the bulb is already suspicious.

Q: How many Outsiders does it take to change a lightbulb?

A: One, but he may not get around to it for a few thousand years.

A2: That answer will cost you one trillion stars.

Q: How many Tnuctipun does it take to change a lightbulb?

A: The entire Tnuctipun race. They have to design a genetically-engineered animal species with a specialized lightbulb-changing limb.

Q: How many Motie Mediators does it take to change a lightbulb?

A: None. It will get trashed in the next collapse anyway.

Q: How many Jinxians does it take to change a lightbulb?

A: Seven. Four to tear off the walls of the room, two to lower the ceiling, and one to change the bulb.

Q: How many psionically lucky humans does it take to change a lightbulb?

A: None. The light bulb will never go out! ■

In Silicon Runes

Jamie Hanrahan

OF HUGOS AND FEN

Are you a member, supporting or attending, of the 1985 Worldcon (Aussiecon)? Probably not, if you're not going -- and most of you probably aren't going. Australia is many dollars away, after all.

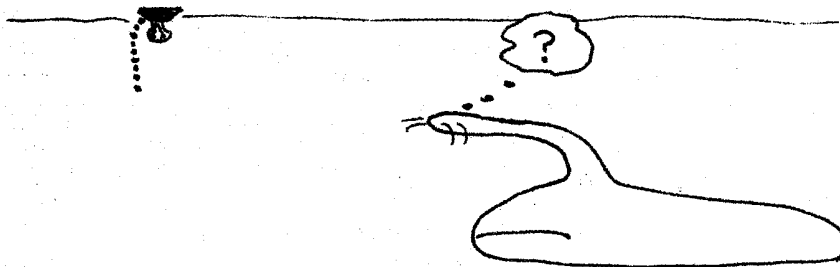
Still, we bought supporting memberships (at \$30 each), for two reasons. The first is to be able to nominate and vote for the Hugos. True, the Hugos are decided by a very small minority of the people who read f&sf these days, but it's a very vocal minority. Many editors pay attention to us. The Hugos for best novel, novella, and novelette last year all went to hard sf pieces (as did two of the Nebulas in those categories, and the third one was borderline); it's no coincidence that there's more hard sf being published these days.

The moral is the same one that you hear every election year: Vote! If you care about what's going on in the field, if you want to express an opinion about what the publishers are doing, nominate and vote for the Hugo award! In no other field of literature does the reading public have a means of expression that has this much influence. Only about 1400 people cast ballots for the Best Novel of 1983, and only a tenth as many bothered to nominate in that category. In so doing they had far more effect on what novels will be published in the near future than they did when they went out and spent money in bookstores. This may or may not be just; that's not the point. The point is that it's a pity that so many fans waste this opportunity to have a say in what's available for them to buy and read.

Of course, the deadline for nominations for Aussiecon's Hugos is already past... but you can still vote on the final ballot. Due to the small size of the con, the total number of ballots cast this year will be even smaller than usual. A novel might carry off the rocket for best of 1984 with just two or three hundred first-place votes. (We don't know what the final ballot looks like yet, but your editor is rooting hard for Vernor Vinge's The Peace War, even if it has to be written in -- see the review column, elsewhere thish.)

WHAT OF GENERAL TECHNICS?

Mary Lynn Skirvin wrote to us expressing concern over my editorial lastish. She was worried that we were intending to abandon the tinkerers in General Technics



to their individual fates and would talk only about f&sf and fandom. Fear not! We'll still run articles on gadget-building... provided, of course, that people send us some. I think that one of the most important things GT can do is to provide a showcase for the homebrew techie's efforts. The fact that there are a hundred or so people out there who will "ooh" and "ahh" over the things I build is one of the reasons that I haven't packed my electronics bench away and gone completely over to the software side.

A caveat, however: Many of the articles we might publish along those lines might be accepted by professional magazines. I was going to run a big piece on the trivia box system I built for a local con... 'til I found out that Radio Electronics would pay from \$150 to \$350 per printed page! I'm sending it to them first; if they turn it down, then I'll run it in Pyro. Take my advice, folks: Give the people who'll pay you money for your labors the opportunity of first refusal! This may not be a very fannish attitude, but it's a practical one...

PHILOSOPHY

Long before it was definite that we'd be editing Pyro I discussed my plans for the zine with a certain well-known faned. He was quick to encourage me to get into fan publishing, but warned me that Pyro wouldn't be considered a "true fanzine" if it was too narrowly-focused, or if it appealed to too small a special-interest group, or if it even had something to say on any topic other than fandom (i.e. other true fanzines and their editors and loccers). A True Fan, he explained, has no other reason for publishing than the sheer joy of communicating with other True Fans, about other True Fans, and generally couldn't be depended upon to trade with or even loc a zine that didn't measure up to these standards.

I sent him a copy of Pyro 35' anyway, and he sent me back a copy of his zine with an offer to trade in the future... so either he was exaggerating, or my memory is exaggerating, or some of both. But the attitude he expressed (or that I remember him expressing) does enjoy some popularity among faneds, and I want to say something about it.

Make no mistake: There is a great deal of joy in fan publishing. I have no words for how I felt when our first locs arrived. (I didn't quite run out of the post office jumping up and down and hollering, "goshwowohboyohboy!".) The idea that someone -- several someones -- out there were sufficiently interested in what we had to say to invest time and effort in writing back is still a little staggering.

But how long could we keep on publishing, I wonder, if all we had to talk about was what other fans were doing? How many pages can you fill with older fans' recollections of the Good Old Days? Are fanzines supposed to exist just to take in each others' (sometimes very old and very smelly) laundry?

Whether they're supposed to or not, that's what a lot of zines seem to do. And make no mistake: Some of them are very successful at it. (I like reading recollections of the Good Old Days. Some of them, anyway.) But that's not where Pyrotechnics is headed. For better or for worse, Pyrotechnics is a fanzine that has something to say. We may seem a little muddled just now about what that is, and we'll likely contradict ourselves from time to time, but that's because we're trying to keep our options open and our zine entertaining... and because we're not taking ourselves too seriously. If we aren't a "true fanzine" because of it, all I can say is that I hope you'll loc us and trade with us anyway. At the very least, we'll have something interesting to write about when someone asks us to write about our Good Old Days...

FALLOUT

[What can you say about the letter column? What needs to be said? Not much, I expect. As a matter of policy, we will put our responses at the end of each letter, not interspersed; anyone who takes the time and trouble to write us deserves to have her or his uninterrupted say. And we will try to refrain from lengthy rebuttals of those who write to disagree with something we've put in the zine, since in that case we've had our say already. As elsewhere in the zine, inane editorial insertions are denoted by indented, bracketed text, like this; we may go to something fancier like italics next time...]

/*
* from DICK SMITH
*/

Pyro 35' arrived. I am moved to comment.

I like Pyro, but when it got several Hugo nominations a couple of years ago (no, not enough to put it on the ballot... but enough to get it noticed) I agreed with the fanzine fans who howled. At the time, Pyro wasn't generally available. I hope that the new policies will make it more so. There are two reasons why this is good: (1) Other fans will hear about techies and techie stuff, and (2) techies will hear about other fans and more traditional fanac.

Other fans deserve the pleasure of techie stuff and especially techies. There's no nicer, kinder bunch in fandom. There are lots of fans who like the hard science stories that techies have always talked about. Fully three-fourths of all fans seem to have something to do with computers, and most of the rest who aren't writers do something or other technical.

But techies can benefit from contact with the rest of fandom, too. The stereotypical techie is even more introverted than the average Joe Phan... always more comfortable with machines than with other people. GTers have always partied together a lot at cons. They end up having less contact with the rest of fandom than they otherwise might, and so I suspect that there are things that they miss.

I hope, Gail and Jamie, that you're going to do fanzine reviews, or at least mention the zines that you get in trade. One of the reasons that the nominations Pyro got were resented is that GT has had so little contact with traditional fanzine fandom. Besides, Uncle Dick's, which I'd like to trade for Pyro, can use the plug.

Perhaps the issue of "what makes you a member of GT? can be settled by discussing what possible benefit there is to having a GT with memberships. If we were the Dorsai Irregulars (and we aren't, thank Ghu!), we could all wear a secret belt buckle, and feel smug. Is there any reason that GT shouldn't be just a circle of friends? I can't think of one just now, but am willing to be corrected. Still, Greg Ruffa's statement that "certainly we could stand to encourage more people to join GT" needs to present incentive for possible victims; it's not there for outsiders now.

Jeff Swycaffer's "Short Essay" was a surprising thing to find in Pyro. I fear that Jeff argues for balance between "snakes and spiders" in The Legless Digest... there hasn't been much support for the mystic way he assigns to the Spiders among techies, and I don't expect there to be much. Part of the reason that techies are separate from others is that they are strongly anti-mystic. Now that I think about it, I wonder why GT has grown moribund at the same time that there has been a lot of fantasy and mystic-irrational SF published.

It's a nice issue, Gail and Jamie. I hope the next one looks even better. I'll send you a copy of the list of trades that Uncle Dick's is currently making. You can pick and choose from whatever of them sounds interesting.

[I'm glad you put that last graf in; now the few dozen or so faneds who will be receiving issue 36 of the notorious PyroTechnics won't solely blame us! We'll run some fanzine reviews when we have our feet a bit more thoroughly wet... probably nextish or the one after. Thanks for your remarks about GT and traditional fandom; that's just what I had in mind.]

/*
* from HARRY ANDRUSCHAK
*/

I have received PyroTechnics #35'. Thank you very much. I have never seen a copy of this zine before. And yes, I am interested.

The main thing in this issue that interested me was Swycaffer's article. I am one of those who can be called a "snake". Solid, one-hundred percent snake. Articles like this make me interested in talking about this subject of World Views. I call myself "snake" in spite of going to the Unitarian Universalist Church... the two are not incompatible.

I suppose I could write an article about that. Before I do, I am enclosing an article I did for APA-L a few months ago. You can read it and decide if you want to reprint the part about rings around Neptune. I still stick by that prediction [that we won't find any], even though the question of Pluto being a runaway moon of Neptune is once again being called into doubt.

[I'm afraid I don't know enough about planetary studies to know what the runaway moon question has to do with rings. Before anyone jumps on Andy, let me mention that we got his letter some weeks before a Science News article reported that some people thought they'd seen some evidence of rings. We don't know what Andy's opinion is now. Oh well, we'll know soon enough (Murphy willing).]

/*
* from MIKE HORVAT
*/

Yep, I was one of the surprised ones who received the recent issue of PyroTechnics. I must say that I am rather pleased. I don't know too much about General Technics, but after reading Pyro, I suspect that we are fellow travelers.

I began my long love affair with sf during the late 50s with the Sputnik fever of science teaching. One of the main reasons that my interests have been shifting to mysteries is that hard science isn't showing up in the sf I try. It's tough for someone with a complete run of Astounding (after 1932) to face today's sf.

Perhaps what I am saying is that I am solidly in your camp... at least as far as having a hard science mentality goes.

What would you think about trading PyroTechnics for South of the Moon (the fannish listing of apas) and Library News (journal of the American Private Press Association Library)?

Reading "A Short Essay" by Jeff Swycaffer, my only comment is that there is a lot of verbiage that says little. I fail to see any support for the conclusion that "Science... is dependent upon its metaphysical underpinnings". His comments describing the two world views are fine, but unless some observation is made beyond mere description the essay would seem pointless. There are some other quibbles:

"Science... tends to see the model as a depiction of reality." What else, pray tell, could it be? As I understand it, that is the definition of a model: A depiction of reality.

"Modern physics is a language wholly of mathematics, obscuring the solid reality of matter." As one holding a degree in mathematics, I have spoken with friends in physics; one doesn't often find a science which sounds more metaphysical than modern physics. It has a beautiful, rich language outside of mathematics. As I understand it, there is no such thing as the solid reality of matter.

Again, Gail, Jamie, thanks for sending me this issue; I do hope that you decide to trade.

[I've heard from several other hard sf readers who've been turning to mysteries lately. But don't despair; some good, rivet-filled sf is still being published, though you do have to dig for it.

Of course we'll trade. And, having just finished John Gribbin's In Search of Schrodinger's Cat, I must agree with you re. the "solid reality of matter". How do physicists sleep nights?]

/*
* from VICTOR KOMAN
*/

Just picked up my copy of Pyro 35' and a good-looking ish it is! But -- I'd like to counter some of the pessimism of "Hard SF in the 80s".

I -- in league with the author -- applaud all of the heroes mentioned. Nemo, Seaton, Channing, and Kip Russell were the technical whizzes I tried to emulate (and splashed enough solder to show me my folly) back in my Golden Age of SF. The efficacious tinkerer is certainly an heroic figure in SF and the real world. And the purported demise of the lone inventor certainly did spell an end to the stories we grew up loving.

I agree that WWII and the space program undercut the message of Engineering Fiction. But I think we differ on the reasons why. Did Nemo or Seaton build their respective ships themselves? No. Verne, Smith, and the rest, though, chose to

ignore the unimportant (to them and to their readers) fact that someone has to build the craft and instead chose to concentrate on the important fact that usually only one person has the overall vision that propels the dream into reality. It is that focus that has been lost to EF.

The blame can be squarely placed on the news media and the government's court historians. WWII thrived and fed on the concept of "teamwork"; Von Braun's German team was played up and the lone pioneer Goddard reviled. Public schools and sports events reinforced this and continue to shove the concept down our throats. Is it any wonder that the current crop of SF/EF writers and readers have forgotten what the individual means, let alone what an efficacious individual is?

Of course we don't have a miracle fuel -- did you expect the same people who run the Post Office to invent it? Of course we've been told that great inventions by individuals are gone forever -- Russian citizens are told the same thing by their government and their press. Even today, as the Space Shuttle becomes both a war wagon to the stars and a junket ferry for Congressmen; as the thousands of disillusioned space techs see their babies being gutted by the winds of political whim, the government and its "teamwork" (actually a pork-barrel alliance of the Defense Department and a few huge, inefficient corporations) is portrayed as the only way to get into space.

But is it? Do you subscribe to the Commercial Space Report? When was the last time you read about Robert Truax in a large-circulation paper? Or Gary Hudson? Phillip Salin? How about Starstruck? Or Dolphin, or Phoenix, or Sea Dragon? Were the profiles (if any) of these Space Entrepreneurs favorable? Or was there the hint that these people were slightly off their rockers? How dare an individual think that he or she can do something better than the government with all its "teamwork"??? (Do you think the National Security Agency wants civilians and individuals roaming in space -- free? They don't even want that on Earth!)

Where have we heard all this before? In fact, in what novels have we read all this before? Are you going to let it dissuade you, grind you down, defeat you?

Richard Seaton still lives! True, his rich friend can't scrape up enough investment capital because it's been taxed away to pay for Death Star defense programs. Perhaps he can't get the materials he needs because he's been outbid by an inflation-fueled State that hopes to print its way out of financial reality. Maybe he can't get the profitable cargo to haul because the Shuttle's rates are subsidized to crush competition. And he may not even be able to hire the help he needs for his "team" because they've been lured away into dead-end jobs in the Space Bureaucracy and are no longer able to see the stars they once saw so near at hand. But he's still fighting. He's working somewhere, at Starstruck, at Pacific American Launch Systems, at Transpace. He's even working in secret, unknown to the world and most especially to NASA, which tolerates no competition.

Someday, though -- perhaps with the aid of GT members or of other techies and fans -- there will be a glow in the western sky. A True Dawn at which we can once again marvel, as the shout rises up --

"DELOS D. HARRIMAN, THOU ART AVENGED!"

What has this got to do with Engineering Fiction? More SF writers should shake off their blinders and look at the real world. NASA isn't the real world -- or at least the only world. I for one am not waiting for Niven or Pournelle or any others to See The Light -- I'm at work on a novel that will restore the concept

of the efficacious individual to the world of SF. It's about how we get into space. You and I. People, not politicians. People who want to live in space, not kill in it. People who want to fly, not spy. (Yes, I'm a semi-filthy pro, though unless you can read German, the only novels available in the US are two SPACEWAY "John Cleve" books, nos. 13 and 17.) (If you can read German, Heyne Verlag published The Jehovah Contract in April (shameless plug).)

I think that the decline of the Heroic Tinkerer in SF was the result of a mid-20th Century shift of focus from Initiator to Process, which paralleled the political shift from Individual to State and a business shift from Entrepreneur to Corporation. I don't think the trend is a result of population, technical complexity, or anything more than a change in philosophy. That change can be reversed. I see no reason to mourn for Don Channing and Richard Seaton. They may be in exile, but they shall return as fresh and as vigorous as ever.

All Clear and On Green. QX! QX!

[Reversing a ten- or twenty-year trend is a tall order for one novel, Victor. But it's happened before, or so it at least seems from the historical perspective. Good luck with it. You know where to send it for a sympathetic review, right?

Oh, and before any of you dismiss Victor's letter as the ravings of a paranoid Libertarian, go find Volume 2 (Summer, 1985) of Far Frontiers and read "Cheap Shots" by G. Harry Stine. Some private firms are trying to get into the launch business, and NASA has stepped on some of them.]

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* from FRANZ ZRILICH

*/

If we stop and think about it, isn't the Apple story SF in some ways? Hard SF? A philosophy buff high on Eastern mysticism and a marshmallow-popping engineer take over a garage and within a year are creating a new industry that will make them very, very rich.

I think one can regain the romance of the lone inventor or two in his/her garage, who cobbles together the next equivalent of the light bulb or telephone. What it requires is a setting -- about five to seven years in the future. The reader is lead to understand that a completely new form of engineering has emerged and there are many small-time inventors working in their shops trying to see what can be done with it. Possibly it is a form of controlled lab bench physics ("Yes! You too can have an Xz-95 in your shop for only \$19.95! Imagine! The equivalent of a CERN atom smasher that just five years ago could only be bought for \$19 billion!") The details of this new Heathkit physics we will leave to someone with a good research bent of mind to explain in a plausible manner.

Our hero/heroes can then cobble together several disparate elements of this new physics in a configuration hitherto never imagined by man or woman. They get a surplus pressurized vessel the size of a small school bus and put a few hatches and airline windows and a crude life-support system into it. They line the exterior with several hundred strategically placed CERN atom-smashers. An IBM AT runs the whole thing.

Our heroes zap off into the sky from their rental storage unit in Pasadena one night and tour the Solar System in three days. Along the way they find an asteroid that is 87% platinum. They return a week later and zip off a couple of tons using improvised space suits. They sell the Pt in the Caribbean, no questions asked. With the several million they now have, they buy an abandoned factory in Youngstown and order several tons of structural steel and five brand-new pressurized vessels (from stock!) the size of small subs.

A few months later, they zap out of Youngstown on a foggy night and again raid the asteroid -- several times. Their ship is made of the five vessels, side-by-side, firmly attached to a steel framework and interconnected by double-hatched, one-meter-diameter high-pressure piping.

The above may seem crazy, but bear in mind that up until WWII, it was not uncommon for wealthy eccentrics to build high-performance aircraft in their own small factories (e.g. Howard Hughes). Even today, the armaments industries in countries such as South Africa and Israel are capable of turning out jet fighters with surprisingly little in the way of infrastructure or manpower.

A more serious story line could entail a Steve Wozniak-like character who, being in early retirement at age 25, extends an earlier technical breakthrough (possibly the same one that made him wealthy) and designs a real space ship. He has this built in pre-fab bits and pieces (like a McDonald's chicken) by scattered subcontractors who are not told what it is they build. With a few handling and transfer machines, and a few months, it is conceivable that a score of people could assemble the thing in an abandoned steel mill in Youngstown or Cleveland.

If all of that still seems crazy, bear in mind that American archaeologists are now digging up a recently discovered Incan city in Peru. Most Americans probably believe that that should not be possible, that the world is now long since "explored out" and every square inch reported in back issues of National Geographic. Actually, that is not true -- there are whole sections of Africa, Asia, and Latin America where not a single Western-trained observer has visited.

Quite a bit of the fantastic is still possible.

For starters, how about if Greg Ruffa ("General What?") acts as a temporary chair to coordinate the establishment of a GT-based organization to build a star-ship? Or at least an interplanetary ship? This organization can develop a few new Apple-type industries to provide petty cash, and the ship can be welded up in an abandoned steel factory that I know of near downtown Cleveland. If built large enough, we could maybe even hold a Worldcon in orbit (we could buy up the old SS United States and convert her...).

[Victor, did you get all that? You know, if we keep printing letters like these, all of Pyro's new readers are going to think that GT is a band of nuts. Just as well; we wouldn't want to give them any false impressions. Alas, I don't think Greg will be able to chair the group you propose; he's now doing orbit analyses for an aerospace firm, and they'd likely regard it as a conflict of interest. You know how the Space Bureaucracy can be...

Now, before we get to the next letter, I must mention that Franz got his copy of Pyro 35' a bit late, as the address we had for him was so old that the forwarding order had expired. Luckily we saw his CoA in File 770. But the Pyro we sent to his old address wasn't wasted. Have you ever wondered who moved into an apartment after you moved out? Read on.]

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* from KAIZAD MISTRY
*/

Hi, I am the new occupant of an apartment which once housed a Franz Zrillich (how do you pronounce that name?) who, I believe, is/was a member of General Technics. I found the firecracker that is Pyro in my mailbox.

Anyway, I like Pyro!! and shall send you an article (if I can get down to writing something) or a check. Soon. A few mundane facts -- I'm an EE grad student at USC; from India (the Indian Institute of Technology, Bombay; been at USC for one semester; people at USC (ref Pyro 35') are too snake-ish for me.

I guess it's some coincidence that I got a copy of Pyro at all. And since I don't believe in cosmic coincidences, I don't think that I have received it. Its presence right before me notwithstanding.

Well, I know what Pyro is about. What is GT about?

I like SF; I like fantasy a la J. R. R. Tolkien; I like semi-colons; I like Godel, Escher, Bach; I like Robert M. Pirzig's book; I like Jethro Tull; I also throw in colons at times: Is GT for me?

I don't have a computer account yet, so I can't give you an E-mail address yet. I hope the lure of articles/\$\$ is enough for you to gamble a twenty-cent stamp.

P.S. I hope my letter is not too incoherent.

[Wow! Now, that's discovering fandom the hard way. I don't know if GT is for you either; no one is sure what direction GT is, let alone should be, headed in. Wait and see, I guess. Meanwhile, here's another issue -- this one mailed to you intentionally. If you have time, you might drop in at a meeting of the Los Angeles Science Fantasy Society (LASFS); USC must have an SF club that can tell you where to find them. Once there, ask to buy a copy of the newly revised "Neo-Fan's Guide to Fandom", and sit in on the business meeting -- you will no longer worry about being incoherent, I promise you.]

/*
* from GEORGE EWING
*/

You're partly right about the decline of the engineer-hero, though if there aren't any Teslas and Edisons and Seatons kicking around, we do have our Gary Kildalls, Clive Sinclairs, etc. as role models. Alexis Gilliland's Rosinante series [see the book review column -- JEH] may not be far from the mark; with lots of automated factories and computer help, the return of the single engineer and/or the Venus Equilateral-style small team may not be impossible. It takes a hell of a lot fewer people to run a factory or a steel mill now than it did in Edison's or Doc Smith's day. A basement/backyard space ship seems pretty unlikely, but I can foresee developments which might allow a gang of techies like a more modern version of Gallun's Planet Strappers to buy or lease a mass-produced Chrysler Aerospike

or Mitsubishi Dumbo shuttle, or more likely, just buy cargo-bay space for their own modules, and assemble their ship in orbit. After making a few megabucks from their basement software or biotech firm, of course.

[A quibble: True megabucks, as opposed to enough spare cash to live comfortably, are damned hard to come by. Basement biotech? Combined with "virus" programs... the mind boggles: Have you read Greg Bear's Blood Music? I'm glad the houses around here don't have basements.]

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* from HARRY WARNER, JR.

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This issue of PyroTechnics was a rather puzzling surprise at first glance. For a while I assumed that General Technics is a corporation whose house organ you have kidnapped and brainwashed into being a fanzine. After I realized it's a fan group, I looked back over the misunderstood things I'd read previously, and all became about as clear as anything does to my befuddled self.

I grew up reading the hard type of science fiction and I still must retain a basic fondness for it. As proof I can volunteer the fact that just last week I began to read Dhalgren, after having owned it for the past three years. (So far I haven't found any science in the Delany mammoth and I suspect most of it isn't fiction, either, so after I finish reading the remaining several hundred thousand words, I think I'll reward myself with a plunge into some of the original Grosset and Dunlap editions of Tom Swift I've been buying up and haven't read yet.)

I'm sure you're basically correct with your theory about where all the engineers in science fiction have gone. But I suspect there may be a more important contributing factor. That's the protest movement that young people pioneered and some older folks shared, starting in the late 1950s and continuing through the 1960s and part at least of the 1970s. Suddenly science was a villain, and scientists were conspirators against the innocent bulk of the population, in the party line followed religiously by the beat generation and those who followed under different designations. Some authors and editors probably felt the same way, and some of those who didn't may have tried to change the nature of their SF so it wouldn't go counter to what seemed to be the current thinking of the young people who make up so much of their audience. Polls seem to indicate that young people today are reverting to the older outlook on life and politics and even science, but so many of the authors and editors and publishers today were part of that protest generation and may still be favoring anti-science stories because of their old preferences; or they may not realize how the current generation has changed.

Greg Ruffa's article caused me to wonder if you'd thought about the possibility of sponsoring a small con designed specifically for fans who are sympathetic to the GT outlook on science and science fiction. Specialized and semi-specialized cons have been springing up in recent years. It shouldn't be hard to find a few pros who are famous for writing hard science fiction and a location where fans are particularly thick like southern California or the New York City-Philadelphia area.

Greg's "The Urban Eyeball" managed to rouse up briefly the old sense of wonder. Reading this installment, I could remember how excited I became the first time I borrowed a book on astronomy from the public library when I was nine or ten and

found in it wonderful facts about the stars and other heavenly bodies somewhat similar to those reviewed here. (But actually looking up into the heavens was much more practical then than it is today for me. I never got a crick in the neck from holding my head at that angle for several minutes when I was that age, and it was safe to gaze into the heavens without interruption after dark, a contrast to today's need to look down and around every thirty seconds or so to make sure a thug isn't sneaking up on me in the shadows.)

I liked Jefferson Swycaffer's essay, though I can't think of anything in particular to say about it. He covers his ground so comprehensively in a small space and takes such a reasonable attitude to his subject that it's hard to think of anything to add or contradict.

Your typography is close to the borderline of visibility for me since I'm one of those in-a-rut old fans who have used the same pair of eyeballs so long they've almost worn out. Thank goodness, you used black ink on white paper, a heresy in the opinion of some fans who reduce type sharply and then print it in green on purple paper. But I shouldn't complain; after all, you could have distributed your fanzine on computer chips.

[I understand that's been done. Is this any better? I'll bet Jefferson won't believe that anyone could have said that about anything he wrote; in the local apa he's (in)famous for stirring up heated arguments. Seriously, thanks for the kind words; we're new at this and every bit of encouragement helps -- lots.]

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* from ROD SMITH
*/

Greetings. Like the new Pyro. Hope you can keep it up.

There was a strong touch of irony in my reading the item on hard SF. You see, just a couple of days before, the NOVA educational TV series had broadcast a program on Edgerton. That's the Edgerton, the guy who invented the stroboscope, super slow motion photography, time-lapse photography, side scan sonar, and a lot more. Here is a man who does in real life what this article claims is no longer reasonable in fiction: He invents devices that get him involved in adventures. His work with the strobe led him to be featured in many newsreels. He also got involved with aerial photography in WWII, saving many lives by creating a super strobe for taking night pictures. He may not have ended the war single-handedly, but he helped win it. After the war was over he participated in the fission and fusion bomb tests in the Pacific, forming a company with two other men to manufacture the equipment, and going on site to install and operate it. In the fifties he began taking pictures underwater, and worked with Cousteau. This relationship led him to develop the side scan sonar in the early sixties.

Maybe his adventures are more like Tom Swift's than Dick Seaton's, but he did have them. What's more, he is still alive and inventing. In the program he claimed that he was able to get more done now that he was retired, since he didn't have to worry about things like faculty meetings and such.

[All right. But I could argue that Edgerton is pretty atypical. If he wasn't, why would they have singled him out for a NOVA program?]

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* from BILL SELIGMAN
*/

I'm impressed with the contents of issue #35', but I disagree with the conclusions of "Hard SF in the 80s"; they're still writing stuff like the Skylark series to inspire us to achieve greatness. Examples:

James P. Hogan. In his stories, the physicist, the computer programmer, or the physicist/computer programmer saves the world from destruction.

Arthur C. Clarke. In most of his recent books, we see the explorations of a scientist and the joy of discovery that scientists experience.

Larry Niven. In all of his books, the lead character is always a problem-solver. This person wins because of more complete or more advanced knowledge.

Besides, remember that paperback book publishers don't print books out of a sense of history, they print them to make money. The Skylark books, the Venus Equilateral stories, and every word Robert Heinlein has ever written are still in print. Every two years or so, a new edition comes out with new covers. Publishers would not bother to do this unless people were still buying, reading, enjoying, and learning from these books.

Of course, you're right in that no one is writing books where the engineer conquers all. Harry Harrison's Star Smashers of the Galaxy Rangers effectively put the genre to its rest. But why can't the other sciences have a chance to rule the universe?

[As you'll see from this month's "Hard SF" column, I disagree with my conclusions too, on second thought. On the other hand... you mentioned Hogan? In The Genesis Machine, yes, the physicist/programmers won the day and saved the world, but they had to set up a near-airtight puzzle box to do it because the world wouldn't have let itself be saved otherwise. And as for themselves, they had to retreat to a base on the Moon to continue their research. In a way which seemed perfectly clear to me at one time, but which I am at a loss to explain concisely now, this can be seen as evidence for my original point. It also left me more interested in finding ways out of the puzzle box than in what happened to the heroes after they set it up. Sigh.]

[We Also Heard From: Sean Malloy, Danny Low, and Jeff Swycaffer all wrote with well-grounded dissensions to last issue's "Hard SF in the 80s" piece (the sequel to which has been postponed 'til next month due to lack of time and space). Jeff Lipton claims that Jeff Swycaffer is "full of poop", but likes the "No Macintosh graphics in this fanzine" disclaimer. Bob Halloran, Dave Taylor, Richard Allen Friedman, Nancy Wax, Al Duester, and Susannah West-Powell sent checks, COAs, comments on what we'd done, and suggestions for next time, in various combinations. Susannah also mentioned that Pyro's first editor, Jeff Duntemann, is now a technical editor for the PC Tech Journal. Way to go, Jeff! A few others, who shall remain nameless, just sent checks. Now, I don't want to discourage anyone from sending us money; it certainly comes in handy when it's time to buy supplies or pay for postage. But the letters, cartoons, and articles are sure a lot more fun to receive. Finally, Mary Lynn Skirvin sent us a long letter disagreeing with our plans for Pyro; we don't have room to print it, but the issues she raised are valid, and we'll discuss them at some length in the next issue.]

LAST WRITES

It's supposed to be very, very neofannish to enumerate all the reasons for a delay in the appearance of a fanzine -- the reason being, I guess, that experienced fen expect fanzines to be delayed. Oh, well.

I know that many of Pyro's long-time readers had misgivings about our plans to use mimeo instead of Xerox. I hope that at least some of your fears will be allayed as you glance through this issue. Some of the pages -- some of the ones that were done early in the print run -- have some problems, but I think the majority are quite good.

We learned a lot getting from there to here. We learned to center images on the stencil and use the mimeo's paper position adjustment to put wide margins on one side of the paper or the other; we learned to cut the stencils upside down so that the first line printed, which often prints erratically, would be the page number instead of the first line of text; we learned that Heyer ink just does not work in our machine, but that some unbranded ink that we get by mail from a place in Orange County (though it's really made in England) works very well... and we're still learning. Next issue should look even better.

There are some problems with mimeo that are not going to go away. Mimeographed pages will almost invariably have some show-through from the other side (that's why mimeo'd zines almost invariably use colored paper; it's more opaque than white); and wherever there is heavy black copy, there will be some offsetting to the back-sides of the other pages in the stack. Wrinkles show up in stencils from time to time, producing long, thin, wedge-shaped areas that don't print. And there is an annoying amount of variation from one end of a print run to the other. Even if the copies at the beginning and the end of a run look all right, you cannot assume that none of the ones in the middle had any problems.

Also, we know that there will always be some things for which the process is simply not suited. (A statement that can be made of any reprographic system, come to think of it.) Rest assured that we will still use Xerox, and will even go all the way to offset, where necessary to show extremely fine detail... or to get good, solid blacks... or for screened images... or simply to satisfy an artist who wants us to print his or her art a certain way, for any reason.

But for the majority of the text and graphics, mimeo would seem to be entirely appropriate.... especially considering the results we got out of this print run (most of them, anyway). (Yes, most of Pyro is already printed as I write this; this page and the TOC and colophon are about all that's left.) Some would prefer that we just go back to Xerox and charge more (including us, when the mimeo is being particularly cranky), but there are two problems with that.

First, Pyro's subscribers don't pay for the cost of producing the zine now, not by a factor of at least five. It would cost at least three times as much to use Xerox, and I don't think we could find the subscribers to foot the bill... nor would we be able to make up the much-larger difference.

Second, if Pyro cost us three times as much to print as it does now (that's a conservative estimate of the cost of Xeroxing this much material, even using reduction), even assuming we could find the subscribers, there is no way we could afford to continue to send it out in exchange for contributions and LOCs -- let

alone send out as many spec copies as we have been. And I don't want people to be required to send money to get Pyro. It's fun to be able to send it out on a whim, and we're basically doing this for fun. (I think...)

So we'll stick with mimeo for now. If someone can come up with a convenient copy service for no more than a penny a side... or convinces lots of people to send us lots of money for subscriptions... we'll consider going back to Xerox. Until then, if you meet us at a con and notice dark stains on our blue jeans, don't assume that we got them working on the car...

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